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16. Abstract (MAXIMUM 200 WORDS) This report documents a survey of U.S. and international regulatory bodies, government agencies, and commercial and military sources for existing and developing codes and standards applicable to marine fuel cell power plants. The survey is part of the joint U.S. Navy/U.S. Coast Guard program to develop fuel cells for marine propulsion and electrical power generation applications. Standards tailored to marine fuel cell design and construction, installation, and operation do not currently exist. Existing land-based fuel cell standards and marine standards for balance of plant systems are examined for potential applicability to marine fuel cells. The report appendices include excerpts of these standards. In addition, standard development efforts by international committees and ship classification societies are documented. The report outlines an approach to develop a unified standard governing marine fuel cells. A partnership between fuel cell manufacturers, shipbuilders, government regulatory bodies, and ship classification societies is recommended to facilitate integration of requirements unique to fuel cells with requirements specific to machinery systems operating in the marine environment. The unified standard would address, as a minimum, fuel cell design and manufacture, installation, safety, training, and plant performance evaluation.					
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EXECUTIVE SUMMARY

This report documents a survey of U.S. and international regulatory bodies, government agencies, and commercial and military sources for existing and developing codes and standards applicable to marine fuel cell power plants. The survey is part of the joint U.S. Navy/U.S. Coast Guard program to develop fuel cells for marine propulsion and electrical power generation applications. While the use of fuel cells is becoming more widespread in land-based applications, marine fuel cells are currently developmental. This codes and standards survey is an essential step leading toward commercial F/C power plants for marine applications.

The report identifies numerous land-based standards which were reviewed and summarized, including American National Standards Institute standard ANSI Z21.83, "Fuel Cell Power Plants," and National Fire Protection Association standard NFPA 853, "Standard for the Installation of Stationary Fuel Cell Power Plants." Second tier standards referenced by the fuel cell standards and other standards addressing balance of plant (BOP) systems and components were identified, reviewed, and summarized. In a similar manner, numerous marine standards were reviewed to identify standards specific to fuel cells and requirements concerning BOP and associated ship systems and components. The report identifies the marine standards that contain requirements potentially applicable to fuel cells. Ship classification societies were contacted to determine their efforts to develop marine fuel cell standards and the report identifies these efforts.

From this survey, it is concluded that existing standards or codes specifically addressing design and installation requirements for marine-based fuel cells do not exist at this time. While significant efforts have been undertaken in recent years to develop land-based standards, the application of these standards for marine fuel cells does not generally address the dynamic aspects and complexities inherent in modern ship design and operation. However, the existing land-based fuel cell standards and applicable marine standards for BOP and associated ship systems and components could form the basis for a unified standard for marine fuel cells. The report appendices identify and include excerpts of these standards.

The report outlines an approach to develop a unified standard governing marine fuel cells. A partnership between fuel cell manufacturers, shipbuilders, government regulatory bodies, and ship classification societies is recommended to facilitate integration of requirements unique to fuel cells with requirements specific to machinery systems operating in the marine environment. The unified standard would, as a minimum, address fuel cell design and manufacture, installation, training, safety, and plant performance evaluation.